Approve

LLC “Spektr” general director

Mr. Tolmatschev \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Project of specifications for the products of sheet glass and mirror manufacture**

Effective date

12th of November 2020

Contents

1. Basic conceptions and definitions 3
2. Technical requirements 4
3. The main parameters and characteristics of the manufactured  
   production 4

3.1 Automatic glass cutting 5

3.2 Glassware with different types of edges manufacturing 6

3.3 Beveled glassware manufacturing 7

3.4 Glassware with holes production 10

3.5 Engraving on the product 10

3.6 Holes milling 11

3.7 Banding products 12  
3.8 UV – Printing 12  
3.9 UV - gluing glassware 13  
3.10 Sandblasting 13  
3.11 Plotter cutting 14  
3.12 Gluing beveled elements on glassware 14  
3.13 Fusing 14  
3.14 Mirrors production "Aluminization" 14  
3.15 Glass surface sandblasting 15  
3.16 Glassware film lamination 15  
4 Material requirements 15  
5 Packaging 16  
6 Transportation and storage 16  
7 Reception rules 17  
Annex No. 1 18  
List of reference documentation 20  
Annex No. 2 Change Registration Sheet 21

**Specifications for the products of sheet glass and mirror manufacture**

Actual specifications apply to sheet glass and mirror products (products) intended for interior decoration in the form of wall, kitchen, interior mirrors with the application of decorative images and materials, glass and mirrors for furniture, glass furniture, safety glass (tempered and laminated), flat and bent, various applications.

1. **Basic conceptions and definitions**

**Glass** is a hard, transparent (colorless or colored), brittle material consisting mainly of quartz sand and glass-forming components (the main one is silicon oxide).

**Mirror** – is a glass with silver reflective coating, protected by a layer of paint.

**Lacobel** –is a decorative glass, one side of which is covered with a smooth layer of paint, resulting in glass becomes opaque.

**Bevels** -are small beveled element of glass or mirror of various shapes.

**Bending** – is a method of heat treatment of glass in a special furnace, allowing to bend it, giving the desired bending radius using a metal mold.

**Fusing** – is a stained glass, made in the form of applications of colored pieces of glass, laid out on a glass base, baked in a special oven. The result is an interesting texture of the finished material, bright and voluminous.

**Plotter cutting** – is a technology that allows to cut the material along the contour of the image of the self-adhesive film. The cutting is produced on a special high-precision machine – the plotter.

**"Aluminizing"** is the technology of mirror production by spraying aluminum film on the glass surface.

**Lamination** is the application of a protective film to the back surface of glassware, which protects from shards while damaging.

**UV printing** is the process of photo printing, using the special inks that harden under the influence of ultraviolet light, forming a polymer coating on the glass. This technology is the most environmentally friendly, what is very important for interior printing.

**UV-gluing** is a modern technology of gluing glass, mirror or metal details by transparent glue and UV light.

**A figured glassware** is a product of curvilinear shape or having at least one angle not 90°.

**Grinding edge** – is processed by diamond-coated grinding wheels, the edge becomes matte.

**Polishing edge** - is a processed by grinding and polishing wheels at high speeds, the edge becomes transparent.

**A bevel** - is a decorative chamfer, a beveled side face on a mirror or glass.

**Edge "FA"** – the most popular trapezoidal shape of the edge, which provides the best geometry of straight sections of processing.

**Edge "RE-pencil"** - the edge of the glass in the form of a semicircle.

**Control (reference) template** –is a template in full size of the future glassware, made of solid material (hardboard, plywood, chipboard, etc.).

**Sandblasting** - is the process of exposure to glass or mirror abrasive materials under the influence of air, the surface of the glass becomes matte.

**Engraving** - is a method of creating an image (drawing, inscription, ornament) on the glass surface by grinding circles with diamond coating, the image becomes matte.

**Engraving with polishing** - is the application of the image (picture, inscription, ornament) grinding and processing by polishing wheels, the image becomes transparent.

1. **Technical requirements**

2.1. Glassware must meet the requirements of these specifications, as well as GOST R 54162-2010, GOST R 54170-2010, GOST R 6799-2005, GOST R 111-2001, GOST R 54161-2010, GOST R 54169-2010, GOST R 54171-2010.

2.2. All dimensions are indicated in millimeters (mm).

2.3. Geometrical sizes of glassware maximum deviations of the of the rectangular form must not exceed the tolerance of the sizes indicated in the Annex No. 1

table 1.

2.4. The difference in length of diagonals of rectangular form glassware must correspond to the table 2.

3. **The main parameters and characteristics of the manufactured production**

* 1. **Automatic glass cutting**

Cutting is performed on glass with a thickness of 3 to 15 mm. The Maximum size of the glass sheet is 6000x3210 mm. It could be provide template scan. The sizes transfer accuracy from the template ±3 mm (chipboard; fiberboard; plywood; corrugated cardboard) depends on material density and template production quality, thickness no more than 25 mm. Template is not scanned if it is made of sandblasted, satined glass or has pencil lines on edge. Cutting accuracy is ±0,35 mm. Permissible values of products deviations manufactured according to the template are given in Annex No. 1 table 3. While curved cuts manufacturing, it is necessary to take into consideration the size of the mating radii for different thicknesses of glass (table 1).

For cutting, it is necessary to provide a drawing in electronic form, or a normal drawing indicating all the necessary dimensions for the construction of the glassware.

**Minimum cutout mating radii**

R3

R 1 R 2

Table 1

Thickness

of glass, mm R1, mm R2, mm R3, mm

4 20 20 20

5 30 30 20

6 40 40 20

8 50 50 20

10 60 60 25

12 70 70 30

15 100 100 50

19 150 150 60

Note: the Depth for R1 and R2 should not be more than ½ D

* 1. **Glassware with different types of edges manufacturing**

3.2.1. The untreated edge is applied if edges of glass will be hidden on end face, chips are allowed not more than 5 mm.

3.2.2 Polished edge with matt surface.

3.2.3 Polished edge with transparent surface.

The accuracy of the edge work +-1 mm.

Processing of complex glassware of any shape, including internal cutouts, thickness 3-15 mm. The maximum sizes of glassware: 3000 x1500 mm, min-150 x150 mm.

The minimum inside radius of 20 mm.

Note: the type and processing requirements of the edge are specified when ordering.

3.2.8. The surface of the polished edge is a matte.

3.2.9. The surface of the glassware edge after cutting has a rough, non-uniform, matte, wavy appearance.

3.2.10. On the boundary of the polished edge allows micro-chips less than 1 mm size.

3.2.11. Polished edge is optically transparent from the end.

3.2.12. The surfaces of the polished edge must be treated evenly over the entire length.

3.2.13. The angles blunting produced manually. Depending on the thickness, type of material and overall size of the glassware, the size of the blunt varies from 1 to 2 mm.

Restrictions on the types of edge processing are given in table 2.

Table 2

Edge types restrictions

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| № | Edge section sketch | Edge type name | Design and technological parameters | | | | |
| The glassware thickness, S mm | The size of chamfer, A mm | Minimum edge radius, R mm | Minimum glassware size, mm | Maximum glassware size, mm |
| 1 |  | FA,  trapezoid straight | 6-15 | 0,5-1,15 | - | 60x60 | 2000x1500 |
| 2 |  | PE pencil,  curved | 3 | 1,5 | 50 | 130x130 | 3000x1500 |
| 4 | 1,5 | 50 |
| 5 | 1,5 | 50 |
| 6 | 1,5 | 50 |
| 8 | 1,5 | 50 |
| 10 | 1,5 | 50 |

* 1. **Beveled glassware manufacturing**

3.3.1 Straight bevel.  
The bevel is made on glass and a mirror with a thickness of 3 to 15 mm. On triplex - not executed.

On the beveled glassware, a displacement of the facet pairing line relative to the angle of the product up to 3 mm is allowed.  
Deviations from the bevel width are allowed ± 2 mm. Standard bevel production angle is 5 ° - 12 °.

Possible width of a straight bevel on a beveling machine

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **4 mm glass** | | | | | | |
| The glassware thickness, mm | Residual glass thickness, mm | Maximum bevel width, mm | Residual glass thickness, mm | Maximum bevel width, mm | Residual glass thickness, mm | Maximum bevel width, mm |
| 40 | 1,5 | 10 | 2 | 10 | 2,5 | 10 |
| 50 | 15 | 15 | 15 |
| 60 | 15 | 15 | 15 |
| 70 | 15 | 15 | 15 |
| 80 | 15 | 15 | 15 |
| 90 | 15 | 15 | 15 |
| 100 | 30 | 30 | 30 |
| 110 | 30 | 30 | 30 |
| ≥120 | 30 | 30 | 30 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **5 mm glass** | | | | | | |
| The glassware thickness, mm | Residual glass thickness, mm | Maximum bevel width, mm | Residual glass thickness, mm | Maximum bevel width, mm | Residual glass thickness, mm | Maximum bevel width, mm |
| 40 | 1,5 | 10 | 2 | 10 | 2,5 | 10 |
| 50 | 15 | 15 | 15 |
| 60 | 15 | 15 | 15 |
| 70 | 15 | 15 | 15 |
| 80 | 15 | 15 | 15 |
| 90 | 20 | 20 | 20 |
| 100 | 20 | 20 | 20 |
| 110 | 30 | 30 | 30 |
| ≥120 | 30 | 30 | 30 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **6 mm glass** | | | | | | |
| The glassware thickness, mm | Residual glass thickness, mm | Maximum bevel width, mm | Residual glass thickness, mm | Maximum bevel width, mm | Residual glass thickness, mm | Maximum bevel width, mm |
| 40 | 1,5 | 10 | 2 | 10 | 2,5 | 10 |
| 50 | 15 | 15 | 15 |
| 60 | 15 | 15 | 15 |
| 70 | 15 | 15 | 15 |
| 80 | 15 | 15 | 15 |
| 90 | 25 | 25 | 25 |
| 100 | 30 | 30 | 30 |
| 110 | 30 | 30 | 30 |
| ≥120 | 40 | 40 | 40 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **≥ 8 mm glass** | | | | | | |
| The glassware thickness, mm | Residual glass thickness, mm | Maximum bevel width, mm | Residual glass thickness, mm | Maximum bevel width, mm | Residual glass thickness, mm | Maximum bevel width, mm |
| 40 | 1,5 | 10 | 2 | 10 | 2,5 | 10 |
| 50 | 10 | 10 | 10 |
| 60 | 20 | 20 | 20 |
| 70 | 25 | 25 | 25 |
| 80 | 30 | 30 | 30 |
| 90 | 35 | 35 | 35 |
| 100 | 40 | 40 | 40 |
| 110 | 45 | 45 | 45 |
| ≥120 | 50 | 50 | 50 |

The minimum beveled glass size is 40x40 mm.  
The maximum size of the beveled mirror and glass is 4 mm thick - h = 2500x up to 1000mm.  
The minimum width of mirror and glass strip 4 mm thick - 40x2000 mm.

**3.3.2 Curved bevel.**Bevel is produced on glass thickness of 4-1 5 mm. The bevel may be polished or matt.  
The curved shape bevel during the transition to a straight line may have a visible transition line.  
The variety of bevel angles are from 3 ° to 15 °, while its maximum width can be on glasses:

|  |  |  |
| --- | --- | --- |
| The glass thickness, mm | The bevel angle, ° | The bevel width, mm |
| 4 | 3° to 15° | 25 |
| 5 | 3° to 15° | 25 |
| 6 | 3° to 15° | 25 |
| 8 and more | 3° to 15° | 30 |

The minimum diameter of the beveled circle is 150 mm.  
The maximum diameter of the beveled circle in automatic mode without loss of quality is 1200 mm (R = 600 mm).  
The minimum outer radius is 75 mm while moving from one line to another.  
The minimum internal radius performed on the glassware is 77.5 mm (Ø155 mm), with smooth wavy lines or small deflections, h of deflection wave is - 50 mm.

Table 3  
  
**Bevel type limitations**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| № | Bevel section sketch | The bevel type name | Design and technological parameters | | | | |
| The glassware thickness, mm | Bevel angle | The bevel width, L, mm | Minimum glassware size, mm | Maximum glassware size, mm |
| 1 |  | Straight bevel | 3-15 | 5-45 | 6-50 | 40x40 | 2500x1000 |
| Curve bevel | 4-15 | 4-45 | 6-30 | Circle ø150 | Circle ø1200 |

**3.4 Glassware with holes production.**

The minimum thickness of the drilled glass is 3 mm.

The maximum thickness of the drilled glass is 15 mm.  
The minimum size of the drilled glass is 300x150 mm.

The maximum size is 2500x1310 mm.  
The drills in stock: Ø 5; 6; 8; 9; 10; 12; 15; 16; 20; 26; 30; 35; 50; 75 mm.



|  |  |  |
| --- | --- | --- |
| Hole sample without  countersinking | Hole sample with  countersinking | Hole sample with  deep countersinking 45 °  (for “coin” system) |

Chips at the hole edges size of not more than 3 mm are allowed.

Countersink holes are made in glass from 4 mm to 15 mm thick, at an angle of 45 °, to a depth of not more than 1/2 of the glass thickness.

Permitted deviations from the given diameter and center of the holes are given in Annex No. 1 Table 4.

* 1. **Engraving on the glassware.**

Engraving can be V-shaped and U-shaped.

The maximum dimensions of the finished glassware are 2000x1000 mm.

The minimum dimensions of the finished glassware are 195x130 mm.  
The engraving glass thickness is 3 ÷ 15 mm.

The minimum length of the engraving line is 30 mm.  
The surface of the engraved line can be polished or matt.  
Engraving lines can be straight and curved, they can branch, passing one into another (the place of mating has a visible characteristic transition). The shape and length of the engraving line meet the restrictions, when creating ornaments, see Table 3.

Table 3  
  
**Engraving type restrictions**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| № | Edge section sketch | Edge type names | Design and technological parameters | | | |
| Glassware thickness, S, mm | Line width size, L, mm | Minimum glassware size, mm | Maximum glassware size, mm |
| 1 |  | V-shape symmetric  engraving | 3 ÷ 15 | 5;6;8;10 | 195х130 | 2000х1000 |
| Note: Minimum engraving line length: L min = 30mm Engraving Minimum Input / Output: 15mm  Tolerance: +/- 2mm Minimum allowable radius of the engraving line: R min = 30 m | | | | |
| 2 |  | U-shape symmetric  engraving | 3 ÷ 19 | 4, 15 | 195х130 | 2000х1000 |
| Note: Minimum engraving line length: L min = 30mm Engraving Minimum Input / Output: 15mm  Tolerance: +/- 2mm Minimum allowable radius of the engraving line: R min = 30 mm | | | | |

**3.6 Holes milling (making cuts in the glassware).**We perform milling and processing of internal cutouts in glass, technological cuts with processing for fittings.  
Milling can be performed on glass with a thickness 3-15 mm.  
The minimum internal radii is 5 mm.

The edge could have chips, therefore its subsequent grinding and polishing is desirable.  
The maximum size of the glassware is 2000x1000 mm.

The minimum size of the glassware is 200x200 mm.

**3.7 Glass bending**Glass bending can be made after various types of processing: cutouts, milling, engraving, beveling.  
Dimensions permissible deviations of the arc length ± 2 mm in glasses up to 6 mm thick and ± 3 mm in glasses more than 6 mm thick.  
Sides permissible deviations of the glassware from the plane to 3 mm inclusive.  
Given radius permissible deviations:  
• in glass with a thickness 4-6 mm ± 3 mm.  
• in glass more than 6 mm ± 4 mm thick.  
Depending on the radius and thickness of the glass, straight edges of the glassware arc admitted up to 50 mm, at the end of the bending process.  
Restrictions on the radii, arc length and height of the glass to be bended are given in Table 4.

Table 4

**Glass bending restrictions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tipe of radius | External radius, R | Arcs  length, L | Height, H | Chord |
| Standard R | 210 | ≤420 | ≤1200 | ≤90 |
| Standard R | 270 | ≤410 | ≤1000 | ≤110 |
| Standard R | 337 | ≤420 | ≤1700 | ≤80 |
| Standard R | 339 | ≤420 | ≤1700 | ≤80 |
| Standard R | 413 | ≤430 | ≤1800 | ≤65 |
| Standard R | 539 | ≤460 | ≤1700 | ≤60 |
| Standard R | 1068 | ≤400 | ≤1700 | ≤30 |
| Standard R | 1328 | ≤550 | ≤1700 | ≤60 |
| Standard R | 1440 | ≤570 | ≤1700 | ≤30 |

**3.8 UV printing.**To place an order, you should provide your file, in accordance with the printing requirements, or select a picture from the existing directory.  
Storage media: CD-R (RW), DVD-R (RW), external USB - drives, flash drives.  
TIF formats, layers merged.

- File size 1: 1  
- The printing resolution is 150dpi to 2 sq.m, not less than 100dpi at files more than 2 sq.m  
CMYK color model

The maximum size of the glass-2000h1000 mm.

The limit deviation of the location of the figure relative to its specified location should not exceed ± 2 mm.

Materials printed surfaces includes: glass, wood, MDF, laminate, plastic, ceramic tiles, metals and other surfaces up to 50 mm thick.

When making art glasses and mirrors with the use of films and printing, it is necessary to take into account that the color scheme of the glass product will differ in tone from the sample that you see on the monitor or the printing catalog for a number of reasons:

All monitors have different calibrations. When printing a catalog, the shades may be slightly distorted

Glass in the mass has a shade and may differ of the tone (within GOST) depending on the delivery batch.

The ink used for printing may vary in color depending on the delivery batch.

The color scheme of the picture on the monitor consists of a huge number of colors (RGB color mode), UV printing is made of only four colors in different combinations (CMIK color mode).

The subjective perception of the finished product is influenced by the time of day, lighting, color of the surrounding interior items.

The image on a large size product will differ in clarity from a small sample (the larger the size of the glassware, the less clear the image).

**3.9 UV gluing.**

A processed edge glass is needed to manufacture a glued construction. The place where the gluing of glass occurs becomes transparent, thus, we get a finished structure without a single hole and connecting elements. There are two types of UV gluing: glass – glass and glass – metal. Tempered glass does not stick together.

**3.10. Sandblasting.**

On the whole glass (transparent, tinted) is applied drawing with self-adhesive film, prepared on the plotter with the unnecessary elements removal. After that, the workpiece is sandblasted.

**3.11. Plotter cutting.**

**Plotter cutting** – is a technology that allows to cut the material along the contour of the image of the self-adhesive film. The cutting is produced on a special high-precision machine – the plotter. The cutting length is limited by the length of the film.

Maximum cutting width MAX - 1200 mm.

**3.12. Gluing beveled elements on the glassware.**

Bevels are glued, both on the matt or glossy surface of the glass.

The coming off of the glued element from the glass is not allowed. Bevels edge is matt and of irregular thickness and can have an arbitrary radius.

The limit deviation of the bevels relative to its specified location should not exceed ± 2 mm. Bevels may have bevel of different widths, their surfaces may have different angles of inclination. The minimal dimensions 30x30 mm.

 

**3.13. Fusing.**

Fusing - decorative element as a result of heat treatment becomes volumetric with streamlined edges.

Maximum dimensions 490x490 mm.

**3.14. The mirror manufacturing "Alyuminization».**

Aluminization is carried out under high temperature conditions and at a pressure of 0.003 PA. Glass billet before the plating is required especially thoroughly degreased. Then the glass is exposed in a vertical cassette and wound up in the chamber of the vacuum installation. For evaporation of aluminum, a wire harness made of heat-resistant tungsten is used – the smallest drops of aluminum are attracted to the glass and settle on it, forming a film with a thickness of slightly more than 0.12 microns. The aluminizing process takes 90 minutes. After the process completion, the cassettes with glass billets of mirrors are removed and studied – the aluminum film should not have stains and areas of smoke.

The maximum number of blanks in the vacuum cassette-6 PCs.

The Maximum size of the blanks MAX-1600X1280

The Minimum size of the blanks MIN-1600X1200

MIN - 1600X1200.

The one cycle time is 90 min.

Aluminized coating is also protected from mechanical damage by a protective layer formed by opaque paint or polymer materials. The polymer protective layer is applied by spraying. During the spraying process, powder paint particles are electrically charged from an external source. Electric field is transferred particles of powder paint to the painted product, which has the opposite charge. Next, the product with the applied powder paint is transferred to the polymerization chamber for" baking " the paint. The process of coating formation is carried out by heating a layer of powder paint to the state of its melting to form a monolithic layer. This creates a monolithic coating on the surface of the product.

The maximum number of blanks loaded into the furnace MAX-50 PCs.

The maximum size of workpieces MAX-1600X1280.

Minimum workpiece size MIN-1600X1200.

The cycle time-50 minutes.

**3.15 The glass and mirror sandblasting.**

In the process of exposure to glass (mirror) abrasive materials under the influence of air, the surface of the glass takes a matte shade. Glass surface subjected to treatment, becomes susceptible to the pollution, and is protected with a special liquid. Minimum glassware dimensions: 600x200 mm. Maximum glassware size: 1500x2500mm.

**3.16 Film lamination.**

Gluing the protective film on the glass and mirror. The film is applied in a continuous layer on the glassware.

The thickness of glass more than 3 mm.

The minimum size of the glass is 100x100 mm.

The maximum size of the glass-3000x1200 mm (width is limited by the width of the film).

**4. Requirements for materials.**

4.1 Glassware is produced from:

\* flat glass GOST 111-2001 brands M1-M7;

\* glass with a decorative coating;

\* tempered glass GOST 54162-2010;

\* other types of glass according to the normative documentation approved in accordance with the established procedure.

4.2 The client's materials.

4.2.1. On the processing of the client's material (glass, mirrors), these specifications do not apply.

4.2.2. All manipulations with the client's materials are performed without guarantee of quality of works and integrity of material.

**5. Packaging.**

5.1. The package must contain products of the same name, color, size.

5.2. The cover layer of the package shall be made of paper or corrugated cardboard.

5.3. The weight of one products package should not exceed 25-30 kg.

5.4. Glassware with an area less than 0.005 sq. m could be packed one encasement of not more than 10 PCs.

5.5. Glassware with Bevels or other elements that protrude relative to the plane of the parts are packed in corrugated cardboard two products with the back side to each other.

5.6. After packing in paper or corrugated cardboard products are placed in boxes.

**6. Transportation and storage.**

6.1 Glassware should be transported by any kind of transport provided its safety and protected from mechanical damage.

6.2. If the transport package is wet, it is necessary to unpack the products in the clients stock as soon as possible, wipe with a clean dry material and dry.

6.3. During storage and operation of glass is not allowed:

\* mutual touch of glasses without laying paper between them, as well as touch on solid objects;

\*wiping the glass with a hard cloth, and a cloth that includes scratching inclusions;

\* hits with hard objects;

\*long-term presence of moisture on the surface (in case of moisture, wipe with a dry clean cloth);

\* chemically active materials use

(sealants, adhesives containing solvent, acid, alkali, etc.) during the installation of mirrors or painted glasses to avoid delamination of the product

\* expose products to low and high temperatures (less than 3° more than 40°) and humidity more than 70%.

6.4. Glassware is recommended to store and use in dry, ventilated, heated, closed rooms (store in a vertical position).

**7. Reception rules.**

7.1 Products are accepted individually or in batches.

Batch is the number of products of the same type and size, paperworked with one

1) name of the manufacturer;

2) name and address of the client;

3) the name of the product;

4) size, thickness, mm;

5) number of products, m2;

7) the date of shipment;

8) signature (stamp) of the packer.

7.2. All claims determined by appearance (quality of edge treatment) obvious shortcomings after receiving the order and signing the documents are not accepted.

7.3. Glassware made according to the template are checked against the template at the issue time.

7.4 The production delivery from the seller's stock is carried out after 100%

payments.

7.5 Appropriate quality glassware, produced according to the individual order size of the client - is not subject of exchange and return.

7.6 Technical conditions, parameters of glass, mirrors correspond to requirements of this specifications.

Annex 1

Table 1

**Glassware sizes limit deviations of rectangular and figured form produced according to the drawing**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Thickness, mm** | **Size, mm** | | | | |
|  | Up to 500 | 500-1000 | 1000-1500 | 1500-2000 | 2000-3200 |
| from 3 to 4 | ± 1 | ± 1 | ± 1 | ± 1,5 | ± 2 |
| from 5 to 7 | ± 1 | ± 1 | ± 1 | ± 1,5 | ± 2 |
| 8 | ± 1 | ± 1 | ± 1,5 | ± 2 | ± 2 |
| from 10 and more | ± 1,5 | ± 2 | ± 2 | ± 2 | ± 2 |

Table 2

**The diagonals length permissible value of the difference in rectangular glassware**

|  |  |  |
| --- | --- | --- |
| The diagonals length, mm | The diagonals length difference, mm, glassware thickness, mm | |
| up to 4 mm | more than 4 mm |
| up to 1600 | 2 | 3 |
| from 1600 to 2500 | 3 | 3 |

Table 3

**Glassware deviations permissible values produced on a template**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Glassware thickness, mm** | | | |
| from 3 to 4 | from 5 to 6 | 8 | 10 - 19 |
| Tolerance  from the rigid template | ± 1 | ± 1,5 | ± 2 | ± 2 |

Table 4

**Permissible values of deviations from the specified diameter and center of the holes**

|  |  |
| --- | --- |
| **Holes diameter, mm** | **Deviations, mm** |
| 5 - 10 | ± 1 |
| 10 - 20 | ± 1 |
| 20 - 50 | ± 1,5 |
| 50 - 63 | ± 1,5 |

Table 5

**Permissible defects in glassware**

|  |  |
| --- | --- |
| **Defects** | **Standards for glass and mirrors** |
| **Bubbles and surface irregularities up to 0.8 mm** | Not allowed in concentrated form |
| **Bubbles and surface irregularities up from 0.8 mm to 2 mm** | **Area not more than 0,1 sq. m:** |
| Not more than 1 Pc. |
| **Area from 0,1 sq. m to 0,4 sq. m:** |
| Within the field – 1 Pc. |
| In age – 2 Pcs. |
| **In glassware with an area of more than 0.4 sq. m. for every 0.4 sq. m., do not allowed more than:** |
| In age – 2 Pcs. |
| Within the field – 1 Pc. |
| **Nodal swill, non-destructive inclusions** | **Area up to 0,1 sq. m:** |
| Not allowed |
| **Area more than 0,1 sq. m:** |
| In age area up to 1 mm – 1 Pc. |
| **Thread svill** | **Area up to 0,1 sq. m:** |
| Not allowed |
| **Area more than 0,1 sq. m:** |
| In age area up to 1 mm – 1 Pc. |
| **Filiform scratches** | Not allowed in concentrated form |
| **Substantial scratches** | **Area up to 0,1 sq. m:** |
| Not allowed |
| **In glassware with an area from 0.1 sq. m.**  **to 0.4 sq.m.:** |
| Allowed a total length of not more than 3 mm |
| **Area more than 0,4 sq. m:** |
| Allowed a total length of not more than 5 mm |
| **Colored, dull and shiny dots up to 1 mm** | **Area more than 0,1 sq. m:** |
| Within the field – 0 |
| In age – 2 Pcs. |
| **Area more than 0,1 sq. m:** |
| Within the field – 0 |
| In age – 3 Pcs. |

Note:

1. The edge of the glassware is considered to be a strip along its contour with a width equal to 0.15 linear dimensions of the product. The rest of the area is considered to be a product field.
2. For glassware with an area less than 0.1 m2 is allowed no more than two types of defects, for the production area over 0.1 m2 - no more than three types of defects.
3. Defects not covered by the table and visible from a distance of 1 m are equated to the defects with which they have the greatest similarity.
4. The defects located from each other at distance not less than 150 mm are considered not dispersed.

In case of several types defects presence in one glassware, their total quantity should be not increase 3 pieces on 1 m2.

**The list of reference documentation**

|  |  |
| --- | --- |
| Regulatory document | Regulatory document title |
| GOST R 54161-2010 | Mirrors. General specifications. |
| GOST R 54170-2010 | Flat colorless glass. |
| GOST R 111-2001 | Flat glass specifications. |
| GOST R 6799-2005 | Furniture glassware. Specifications. |
| GOST R 7376-89 | Corrugated cardboard. General specifications. |
| GOST R 54169-2010 | Flat painted glass. |
| GOST 8273-75 | Wrapping paper. |

Annex 2

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Changes registration list** | | | | | | | | | |
| Sheet (page) numbers | | | | | Total  sheets (paiges) in document | №  of document | Incoming  number of accompanying document and date | Signature | Date |
| Ch. | Changed | Replaced | New | Canceled |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |